Highly Accelerated Stress Test System
(HAST Chamber)
Creates temperature, humidity, and pressure environments to IEC60068-2-66 standard.

Humidity resistance evaluation tests for electronic components

Customers require test results that correlate accurately to those from the field in a minimal amount of time.

The Highly Accelerated Stress Test Chamber EHS Series offer high performance, functionality and ease of use, and are compliant with the international IEC60068-2-66 standard.

Many convenient functions and safety features are included for bias testing.
EHS-211M

EHS-221MD
Improved functionality and ease-of-use for bias testing.

- **The chamber interior is formed for easier specimen loading**
  
The pressure vessel is of spherical form which distributes pressure evenly and has superior strength. The test area is expanded to its maximum size to easily load printed circuit boards and other specimens.

- **The double stage model answers the need for diverse test conditions and large capacity (MD type)**
  
The units are designed so that the test condition of each chamber can be set individually, enabling this model to effectively reproduce diverse test conditions on a large number of specimens.

- **Specimen signal terminals can be added depending on requirements**
  
The standard configuration is 12 specimen signal terminal pins. For double-stage type, 12 pins for each chamber. The EHS-211(M･MD) and 411(M･MD) can be expanded up to a maximum of 60 pins, in 12-pin units (optional), and the EHS-221(M･MD) to 72 pins for each chamber. (optional)

- **Customized racks that free complicated wiring (sold separately)**
  
  We can customize racks to fit the client's specimens to enable voltage and signal application, simply by setting a printed circuit board to the connector. We also offer sliding racks, for easier positioning and wiring of specimen.
Even greater convenience and safety.

**Easy program setting**

Program capacity of 10 patterns with 30 steps per pattern. Simple operation using up and down keys for program setting, as well as adjustment of temperature, humidity and time values.

**Safe and reliable door**

The system employs a button operated automatic door locking mechanism. It prevents the door from being opened while the test chamber is pressurized.

**Automatic humidifying water supply system**

At the start of testing, the humidifying water needed for that test is automatically taken from a water tank. A slit on the front side allows the remaining amount of water in the tank to be checked at a glance.

**Protection measures for specimen**

Standard equipment includes a specimen power supply control terminal, which output contact signals to allow voltage and signals to be applied to the specimen during testing. When a problem occurs, specimens and chamber are fully protected. Power supply to the specimen is halted, and protection mechanisms for preventing overheating and boil-dry are activated.

**Supports anxiety-free use**

A variety of protective mechanisms include; overheat/overpressure protector, boil-dry protector, detection of water supply failure and incomplete door-lock, leakage breaker, and temperature sensor disconnection protector. The system also employs an external alarm terminal with an alarm buzzer and lamp. When a problem occurs, those in the vicinity are immediately warned.
Complies with IEC60068-2-66 standard testing while maintaining compatibility with conventional test methods

● Conforms to international IEC60068-2-66 standard
  - IEC60068-2-66 is an environmental testing standard of the IEC (International Electro-technical Commission). With ESPEC’s unique wet and dry bulb temperature control function, the EHS Series meets all requirements for test equipment and test operation specified in IEC60068-2-66. The EHS Series can also satisfy other test conditions of EIA/JED 4701, JEDEC and EIA/JESD22-A110-A as well as IEC.

* ESPEC was directly involved in drawing up the IEC60068-2-66 standard, and our technical concepts and measurement data were used in its development.

● Evaluation of ion migration

Example of the Highly accelerated stress test system with the Ion migration evaluation system

● Wet and dry bulb temperature control (M type) conforms to IEC60068-2-66 standard

With ESPEC’s unique wet and dry bulb temperature control on M type chamber, temperature and humidity are measured directly using a wet and dry bulb temperature sensor. This ensures highly precise temperature and humidity control over the entire testing process, from before testing to the post-testing temperature decrease or hold process. After testing is complete, the temperature and humidity are allowed to drop for a fixed period. In the hold process, the chamber is kept at a fixed environment until the door is opened and specimens are removed. This makes it possible to place a specimen in a constantly controlled temperature/humidity environment, and keep it from drying after returning to atmospheric pressure.

● Free from pressure and temperature shock and drying of specimens after test

In all control modes, abrupt changes in pressure and temperature after testing have been eliminated through mechanisms for gradual depressurization, and air/water discharge. This prevents vaporization of moisture contained in the specimen, and provide accurate test results in correlation to the field.
Control functions to enable use of previous data

The control mode can be switched to match previous data.

M type:
- Wet and dry bulb temperature control
- Unsaturated control
- Wet saturated control

Standard type:
- Unsaturated control
- Wet saturated control

Three modes of operation control

- The temperature and humidity gradient before and after testing can be controlled.
- After testing is complete and chamber pressure reaches 0.010MPa (Gauge), only air is discharged; humidifying water is retained.
- In the hold process, temperature and humidity inside the chamber are maintained at the specified level. (+50 to +95°C/75 to 95%rh)

- During temperature heat-up when condensation can easily occur on the reverse side of the specimen, the temperature of the humidifying water automatically increases while keeping it 30°C lower than the chamber temperature.
- After testing is complete, the chamber is left to cool and depressurize naturally until chamber pressure reaches 0.010MPa (Gauge). Then both air and water are discharged.

- Chamber temperature is controlled through a humidifying heater.
  (chamber temperature = humidifying water temperature)
- After testing is complete, the chamber is left to cool and depressurize naturally until chamber pressure reaches 0.010MPa (Gauge). Then only air is discharged; humidifying water is retained.
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>EHS-211(M)</th>
<th>EHS-211MD</th>
<th>EHS-221(M)</th>
<th>EHS-221MD</th>
<th>EHS-411(M)</th>
<th>EHS-411MD</th>
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</thead>
<tbody>
<tr>
<td>Test system classification</td>
<td>Single vessel type</td>
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<tr>
<td>Control system</td>
<td>Fixed value continuous temperature and humidity control; program operation; humidity control when temperature is rising or falling (M/ MD type)</td>
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<tr>
<td>Temperature and Humidity setting</td>
<td>User-set from operating panel</td>
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</tr>
<tr>
<td>Noise emission</td>
<td>below 46dB</td>
<td>below 50dB</td>
<td>below 46dB</td>
<td>below 50dB</td>
<td>below 46dB</td>
<td>below 50dB</td>
</tr>
<tr>
<td>Temperature control range</td>
<td>+105.0 to +142.9°C (+221 to +289.2°F)</td>
<td>+105.0 to +162.2°C (+221 to +324°F)</td>
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<tr>
<td>Pressure range</td>
<td>0.020 to 0.196MPa (Gauge)</td>
<td>0.020 to 0.392MPa (Gauge)</td>
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<tr>
<td>Temperature and humidity fluctuation</td>
<td>±0.5°C / ±3%rh</td>
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<tr>
<td>Temperature uniformity</td>
<td>±0.5°C at 100%rh, ±0.7°C at 75%rh</td>
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<tr>
<td>Heat up and pressurization time (at RT + 23°C)</td>
<td>0→0.196MPa (Gauge) Approx. 30 min.</td>
<td>0→0.196MPa (Gauge) Approx. 60 min.</td>
<td>0→0.392MPa (Gauge) Approx. 45 min.</td>
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<tr>
<td>Temperature control range</td>
<td>+105.0 to +132.9°C (+221 to +289.2°F)</td>
<td>+105.0 to +151.1°C (+221 to +304°F)</td>
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<td>0.020 to 0.196 MPa (Gauge)</td>
<td>0.020 to 0.392 MPa (Gauge)</td>
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<td>Heat up and pressurization time (at RT + 23°C)</td>
<td>0→0.196MPa (Gauge) Approx. 45 min.</td>
<td>0→0.196MPa (Gauge) Approx. 90 min.</td>
<td>0→0.392MPa (Gauge) Approx. 75 min.</td>
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<tr>
<td>Temperature control range</td>
<td>+105.6 to +142.9°C (+221 to +289.2°F)</td>
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<tr>
<td>Humidity control range</td>
<td>75 to 95%rh</td>
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<tr>
<td>Temperature and humidity fluctuation</td>
<td>±0.5°C at 98%rh, ±0.7°C at 75%rh</td>
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<tr>
<td>Heat up and pressurization time (at RT + 23°C, no specimen)</td>
<td>0→0.196MPa (Gauge) Approx. 60 min.</td>
<td>0→0.196MPa (Gauge) Approx. 90 min.</td>
<td>0→0.392MPa (Gauge) Approx. 75 min.</td>
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<tr>
<td>Temperature control range</td>
<td>+50.0 to +95.0°C (+112 to +203°F)</td>
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<tr>
<td>Temperature pull-down time (at RT+23°C, no specimen)</td>
<td>From +142.9°C / 75%rh to +85.0°C / 85%rh Approx. 120 min.</td>
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<tr>
<td>Wet-bulb wick</td>
<td>Capable of approx 200hr chamber running time (Figure given for +162.2°C, 75%rh and no specimens.)</td>
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</tbody>
</table>

*1 In compliance with the requirements of the European Community Directives. (hereinafter referred to as CE spec)

*2 Point of measurement : 1.2m off floor *1m in front of chamber (JIS Z8731)
Temperature and humidity indication and control operations for this equipment are based on Table A.1, Annex A, IEC Standard 60068-2-66.

Humidity range is from 75% to 98% rh for wet and dry bulb control.

For humidifying water, please use pure water of not less than 0.05MΩ-cm (20μS/cm or below).

Temperature and humidity indication and control operations for this equipment are based on the Steam Pressure Table of Table A.1, Annex A, IEC Standard 60068-2-66.
**MODEL**

EHS - [ ] [ ] [ ] [ ]

- D: Double stage
- M: M type (Wet and dry bulb temperature control)
- Chamber capacity: 1: 18L, 2: 46L
- Pressure range: 2: 0.020~0.196MPa (Gauge), 4: 0.020~0.392MPa (Gauge)

**SHelves**

- Large: 248 W x 288 D mm
- Small: 229 W x 288 D mm

**FUSE** (250V 3A)

**PLug for external alarm terminal / specimen power supply control terminal** (with cable)

**Cable clamp**

**Wet-bulb wick (for type M)**

- 50

**PORTable water tank**

- (10L polyethylene tank)

**BRush**

**WAter drain hose nipple**

**USer's manual**

**ACCESSORIES**

- Shelves: large x 1, small x 1
- EHS-211(M) - 411(M)
  - EHS-211(M)
    - Large: 248 W x 288 D mm
    - Small: 229 W x 288 D mm
  - EHS-221(M)
    - Large: 348 W x 396 D mm
    - Small: 285 W x 416 D mm

- Fuse (250V 3A)
- Plug for external alarm terminal / specimen power supply control terminal (with cable)
- Cable clamp
- Wet-bulb wick (for type M)
- Portable water tank
- Brush
- Water drain hose nipple
- User's manual

**TEST AREA DIMENSION DIAGRAM**

- EHS-211 (M・MD) - 411 (M・MD)
  - Units: mm (inch)
  - Front view
  - Right side view (cross-section)

- EHS-221 (M・MD)
  - Units: mm (inch)
  - Front view
  - Right side view (cross-section)

**SAFETY DEVICES**

- Overheat protector
- Boil-dry protector
- Overpressure prevention switch
- Power loss default circuit
- Leakage breaker
- Safety valve
- Temperature sensor disconnection alarm
- Air-circulating fan/motor rotation alarm
- Wet-bulb wick dry alarm
- Door lock alarm
- Water suspension relay
- External alarm terminal
- Specimen power supply control terminal

**INSTRUMENTATION SPECIFICATION**

- No. of patterns: 10
- No. of steps: 30 steps/pattern
- Control: Ramp, constant setting
- Program setting: Loop, skip, end command*
- Max. time setting: Total 999.9hrs per pattern

* Time signals can be set for each step when equipped with time signal (option). Each loop command can repeat the specified steps up to 99 times.

**ACCESSORIES**

- Shelves: large x 2, small x 2
- EHS-211MD - 411MD
  - EHS-211MD
    - Large: 248 W x 288 D mm
    - Small: 229 W x 288 D mm
  - EHS-221MD
    - Large: 348 W x 396 D mm
    - Small: 285 W x 416 D mm

- Fuse (250V 3A)
- Plug for external alarm terminal / specimen power supply control terminal (with cable)
- Cable clamp
- Wet-bulb wick (for type M)
- Portable water tank
- Brush
- Water drain hose nipple
- User's manual

**PRESSURE RANGE**

- EHS: 2 : 0.020~0.196MPa (Gauge)
- 4 : 0.020~0.392MPa (Gauge)

**INSTRUMENTATION SPECIFICATION**

- No. of patterns: 10
- No. of steps: 30 steps/pattern
- Control: Ramp, constant setting
- Program setting: Loop, skip, end command*
- Max. time setting: Total 999.9hrs per pattern

* Time signals can be set for each step when equipped with time signal (option). Each loop command can repeat the specified steps up to 99 times.
OPTIONS

Paperless recorder (Portable type)
Records temperature, humidity and pressure inside the chamber. Additional inputs may also be recorded.
Temperature range: 0 to +200°C
Humidity range: 0 to 100%rh
Pressure range: −0.1 to 0.5MPa (Gauge)
Number of inputs:
  Temperature 1
  Humidity 1
  Pressure 1
(3 more channels can be turned ON)
Data saving cycle: 5 sec
External recording media:
  CF memory card port
  (Includes a 256MB CF card)
  USB memory port

Temperature, humidity and pressure recorder
Records:
  Test area temperature
  Test area relative humidity
  Test area pressure
Recorder scale plate:
  0 to +200°C / 0 to +100%rh
  −0.1 to 0.5MPa (Gauge)

Time signal
Contact output specifications
Operation: on/off at each step
Number of channels: 2

Additional specimen signal terminals
EHS-211(M)-411(M)
  ⋅ 12pins (6ch*)×up to 4 sets
EHS-211MD-411MD
  ⋅ 12pins (6ch*)×up to 4 sets per chamber
EHS-221(M)
  ⋅ 12pins (6ch*)×up to 5 sets
EHS-221MD
  ⋅ 12pins (6ch*)×up to 5 sets per chamber
* The numbers of channels given are for configurations with two I/O systems.

Teflon-coated shelves
Standard shelves (large, small) with Teflon coating.

Specimen baskets
Type A: 150W×50H×150Dmm
Type B: 100W×50H×200Dmm
Type C: 95W×20H×95Dmm

Antiseismic brace
Used to fit chamber onto the floor.

Communication function
Enables management of chamber operation
  ⋅ RS-232C
* Select one other than standard RS-485.

Communication cable
  ⋅ RS-485 5, 10m
  ⋅ RS-232C 1, 2, 4m

Some photographs listed in this catalog contain Japanese display.

Safety precautions
● Do not use specimens which are explosive or inflammable, or which contain such substances. To do so could be hazardous, as this may lead to fire or explosion.
● Be sure to read the operation manual before operation.